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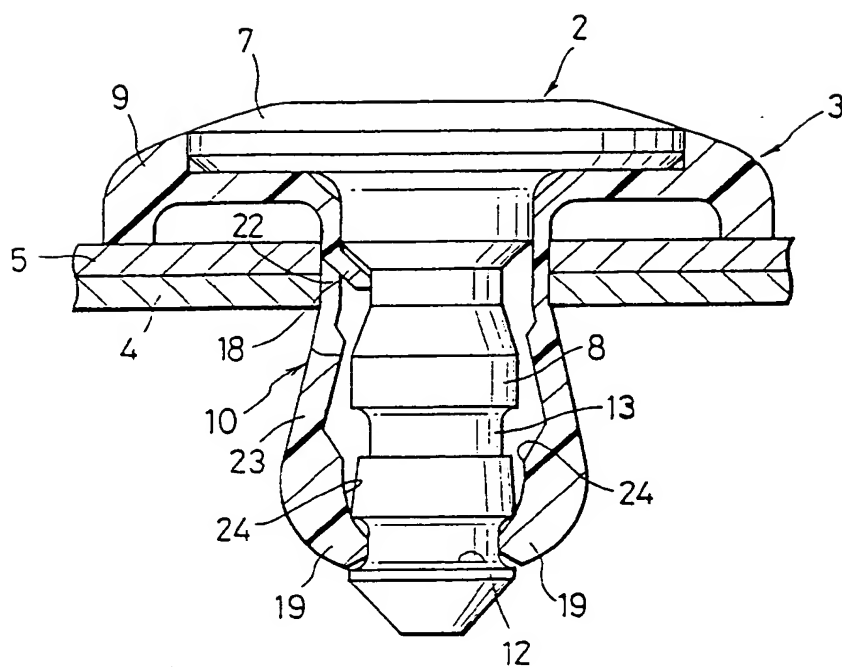
(54) MEMBER MOUNTING CLIP.

(57) A clip (1) which exhibits a sufficient degree of connecting force even when an applicable range of panel thickness is widened, i.e., even when the panel thickness is increased or reduced, and is highly resistant against a pulling-out force and easy to remove. The clip (1) comprises a pin (2) having a flange (7) and a shaft portion (8) and a bush (3) having a flange (9) and a shaft portion (10) and hollowed so as to receive the pin shaft portion (8), wherein the bush shaft portion (10) is inserted into holes of panels (4, 5) which are to be connected to each other and then the pin shaft portion (8) is inserted into the hollow shaft portion of the bush so as to expand the diameter of bush shaft portion, whereby the panels (4, 5) are connected to each other by this expanded shaft portion and the bush

flange. The bush shaft portion (10) is constructed such that its root portion (22) adjacent to the flange (9) is made thinner than its intermediate portion (23) up to the intermediate portion, and the bush shaft portion (10) is flexed from the root portion (22) so as to be expanded, whereby a high connecting force can be maintained even with a thin panel. Moreover, a rib (24) formed at a leading end thereof is brought into abutment with the pin shaft portion whereby the bush shaft portion is prevented from inward flexure to thereby provide high resistance against a pulling-out force. A gap (25) is formed between the pin flange (7) and the bush flange (9) for allowing the leading end of a tool to be inserted thereinto to facilitate the removal of the clip.

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FIG. 7



Technical Field

The present invention relates to a component fastening clip comprising a pin and a bush to connect attachment components such as two panels to each other.

Background Art

There is a well known clip comprising a pin and a bush and connects that a shank of the bush is inserted into holes of attachment components such as two panels and then a shank of the pin is inserted into the hollowed shank of the bush to diametrically enlarge a portion of the bush shank so that the attachment components are connected to each other by means of the enlarged shank portion of the bush and a flange of the bush. This clip facilitates mounting operation because the attachment components can be connected to each other only by inserting the bush shank into holes of the attachment components and then the pin into the bush shank.

Consideration is made on a case where a conventional clip would be applied to panels as attachment components having different thicknesses over a wide range. If plural attachment components are thick as a whole, the components can be connected to each other by the enlarged diameter portion of the bush shank and the bush flange. However, thin attachment components as a whole cannot satisfactorily be connected to each other because the root portion of the bush is little enlarged so that a panel remains floating from the other. If the length of the bush is increased to deal with thick panels, the length from the bottom surface of a panel to the end of the bush becomes too long for thin panels and the rigidity of the shank cannot be kept at a high level to reduce the resistance of the clip to pulling force. Therefore, to take care of the wide range of the panel thicknesses, a large number of clips are necessary to meet the different panel thicknesses.

Disclosure of Invention

Accordingly, an object of the present invention is to provide a component fastening clip having a sufficient, high coupling force for thick panels and even for thin panels over a wide range of thicknesses of the panels, and also a high resistant force against pulling force.

Another object of the present invention is to provide a clip which is easily removable after the clip is mounted on the components and is also reusable.

In order to attain the above objects, according to the present invention, there is provided a clip

comprising a pin including a flange and a shank; and a bush including a flange and a shank with the bush being hollowed for receiving the pin shank therein, wherein the bush shank is inserted into holes of attachment components to each other and then the pin shank is inserted into the bush shank to enlarge the diameter of the bush shank so that the attachment components are connected to each other by means of the enlarged diameter portion of the bush shank and the flange of the bush. The clip is characterized in that in the bush shank, a root portion adjacent the flange extends to a mid portion with such a thickness that the root portion is thinner than the mid portion. Thus, the bush shank can be bent from the root portion thereof to be enlarged diametrically, so that a high coupling force is maintained even for thin panels to prevent one panel from floating from the other panel. Owing to its high resistance against pulling force, there is no need to lengthen the shank.

The clip of the present invention produces a satisfactory result when the length of the thin portion from the root to the mid portion of the bush shank is substantially 30% of a maximum thickness of the panels. The clip of the present invention can be so constructed that the clip is positioned between a non-enlargement coupled position that the pin shank is inserted in the bush shank but does not enlarge the diameter of the bush shank while the pin flange is spaced apart from the bush flange, and a diameter enlargement coupled position that the pin shank is further inserted into the bush shank so as to enlarge an end portion of the bush shank by means of an end portion of the pin shank while the pin flange is in surface-contact with the bush flange, and that the end portion of the bush shank is formed with radially inwardly projecting protrusions. Thus, a higher resistance against to pulling force is enhanced.

In the clip of the present invention, there can be a space between the pin flange and the bush flange around the periphery of the pin flange at the diameter enlargement coupled position, so that the end of a tool such as a screw-driver can be forced into the space to return the clip to the non-enlargement coupled position.

Another clip of the present invention can be formed so that a diametrically crossing engagement bar is formed on the end of the hollow shank of the bush; the pin shank is composed of two legs apart from each other toward the end thereof; the end portion of each leg is formed with a recessed portion to receive the engagement bar to form a first engagement pawl to engage with the engagement bar so that the clip can be positioned at a non-enlargement coupled position that the pin shank is inserted in the bush shank but does not enlarge the bush shank diametrically; the mid por-

tion of each leg has, on the inner side thereof, a second engagement pawl engaging with the engagement bar to hold the legs apart from one another so that the clip can be positioned at a diameter enlargement coupled position that the pin shank is further inserted in the bush shank to enlarge the diameter of the end portion of the pin shank; and the inner side of each leg has a third engagement pawl which is formed with a recessed portion to receive the engagement bar so that the clip can be positioned at a third position that the pin is still further inserted in the bush shank to return the bush shank to the non-enlargement coupled position. Thus, removal of the clip can be further facilitated.

Brief Description of Drawings

Fig. 1 is a half-sectional front view of a first embodiment of a clip of the present invention which is at a clip disengagement prevention coupled position.

Fig. 2 is a sectional front view of the clip of Fig. 1 which is at a non-enlargement coupled position.

Fig. 3 is a front view of a pin of the clip.

Fig. 4 is a half-sectional front view of a bush of the clip.

Fig. 5 is a partially broken side view of the bush of Fig. 4.

Fig. 6 is a sectional front view of a condition that the clip of Fig. 1 is at a diameter-enlargement coupled position to connect a thick panel to another panel.

Fig. 7 is a sectional front view of a condition that the clip of Fig. 1 is at the diameter-enlargement coupled position to connect a thin panel to the other panel.

Fig. 8 is a plan view of a second embodiment of a clip of the present invention.

Fig. 9 is a sectional front view showing a removal operation of the clip of Fig. 8.

Fig. 10 is a sectional front view of a third embodiment of a clip of the present invention which is at a non-enlargement coupled position.

Fig. 11 is a sectional front view of the clip of Fig. 10 which is at a diameter enlargement coupled position.

Fig. 12 is a sectional front view of the clip of Fig. 10 in a third position that is to be returned to the non-enlargement coupled position.

Fig. 13 is a front view of a pin of the clip of Fig. 10.

Fig. 14 is a plan view of a bush of the clip of Fig. 10.

Fig. 15 is a front view of the bush of Fig. 14.

Fig. 16 is a sectional view taken along line A-A of Fig. 15.

Fig. 17 is a sectional view taken along line B-B of Fig. 14.

Best Mode for Carrying out the Invention

The present invention is described further by way of embodiments, with reference to accompanying drawings. Figs. 1 through 7 show a first embodiment of a clip 1 of the present invention. The clip 1 comprises a pin 2 and a bush 3, both of which are made of plastic material, respectively. As shown in Figs. 6 and 7, the clip 1 connects two panels 4 and 5 as attachment components to each other. A shank of the bush is inserted into holes of the panels to be connected and the pin is forced into the bush shank to enlarge the diameter of the bush shank, so that the panels 4 and 5 are connected to each other by means of the enlarged diameter portion and a flange of the bush. For example, the panel 4 is a vehicle body and the panel 5 is a panel to be mounted on the vehicle. In the preferred embodiment, the clip 1 can be positioned at one among positions including a clip disengagement prevention coupled position as shown in Fig. 1 that the pin 2 and the bush 3 are coupled to prevent them from disengaging from each other, a non-enlargement coupled position as shown in Fig. 2 that the pin 2 is slightly forced into the bush 3 to be ready for clip insertion into panel holes, and a diameter enlargement coupled position as shown in Figs. 6 and 7 that the clip connects the panels 4 and 5 to each other. The non-enlargement coupled position of Fig. 2 is also a released position returned from the diameter enlargement coupled position as shown in Figs. 6 and 7. In Fig. 6, the panel 5 is thick while in Fig. 7, the panel 5 is thin. As shown in Fig. 3, the pin 2 has a flange 7 and a shank 8 hanging down from the flange. As indicated by broken lines in Fig. 3, the pin shank 8 is hollowed to save the material and to reduce the weight. The bush 3 comprises a flange 9 and a shank 10 hanging down from the flange as shown in Figs. 4 and 5. The bush is hollowed to receive the pin shank 8.

In order to selectively position the clip 1 at one of the three coupled positions including the clip disengagement prevention coupled position of Fig. 1, the non-enlargement coupled position of Fig. 2 and the diameter coupled position of Fig. 6, the shank 8 of the pin 2 is formed with a first engagement groove 12 at its end portion and a second engagement groove 13 which is formed adjacent to the first engagement groove 12 as shown in Fig. 3. On the lower side below the first engagement groove 12, the shank diameter is reduced for easy insertion into the bush shank. On the upper side of the first engagement groove, the shank diameter is tapered upwardly. The upper side of the second

engagement groove 13 is tapered. The lower side of the second engagement groove, however, is provided with a step portion 14 which is cut horizontally so that first engagement pawls (described later) of the bush shank 10 are brought into engagement with the step portion 14 to firmly restrict the bush from downward movement. Above the engagement groove 13, a large diameter portion 15 is formed.

As shown in Figs. 4 and 5, the shank 10 of the bush 3 is divided by a plurality (three in the embodiment) of slits 17 to be enlarged diametrically when the pin shank 8 is inserted. On the inner side of the bush shank 10, first engagement pawls 18 are formed at a position that is close to the flange 9 but is not affected by enlargement of the diameter of the bush shank 10. Second engagement pawls 19 are formed at the end of the shank. The second engagement pawls 19 are formed between the slits 17. On the top surface of the bush flange 9, as shown in Fig. 5, a groove-recessed portion 20 is formed to define a space that an end of a tool such as a screw-driver can be inserted. The pin flange 7 has a smaller diameter than the bush flange to establish or maintain the space of the recessed portion 20, so that the pin 2 can be drawn up from the bush 3 easily.

The first and the second engagement grooves 12 and 13 of the pin shank 8 and the first and second engagement pawls 18 and 19 of the bush shank 10 enable the pin 2 and the bush 3 to be selectively positioned at the aforementioned three positions. At the clip disengagement prevention position of Fig. 1, the first engagement pawls 18 of the bush shank 10 are in engagement with the first engagement groove 12 of the pin shank 8. At the non-enlargement coupled position of Fig. 2, the first engagement pawls 18 of the bush shank are in engagement with the second engagement groove 13. At the diameter enlargement coupled position of Figs. 6 and 7, the second engagement pawls 19 of the bush shank engage with the first engagement groove 12 of the pin shank to enlarge the diameter of the bush shank 10. When the pin 2 is attempted to be drawn out of the bush 3 at the non-enlargement coupled position of Fig. 2, the step portion 14 of the second engagement groove 13 of the pin shank 8 functions to confine the first engagement pawls 18 in the second engagement groove 13 so that the bush is surely drawn out of the panels 4 and 5 together with the pin. Even if the clip is left at the diameter enlargement coupled position of Figs. 6 and 7 for a long period of time to deform the bush shank into a diametrically enlarged shape, the first engagement pawls 18 are not affected by the diameter enlargement of the bush shank 10 because of the positions of the pawls. Therefore, the first engagement pawls 18

are kept in their original posture, so that the pawls always remain in engagement with the second engagement groove 13 to allow the pin and the bush to be drawn out together without fail.

According to the present invention, in the bush shank 10, a root portion 22 adjacent the flange 9 extends to a mid portion 23 with such a thickness that the root portion 22 is thinner than the mid portion 23. When the thick panel 5 of Fig. 6 is connected to the panel 4, the end of the bush shank is enlarged diametrically at the diameter enlargement coupled position, so that the two panels are connected firmly. Even when the thin panel 5 of Fig. 7 is connected to the panel 4, the bush shank 10 is also bent at the thin root portion 22 to be enlarged diametrically at the diameter enlargement coupled position, so that its coupling force is maintained at a high level even for the thinner panel 5. Since the diameter of the bush shank 10 can be enlarged at the root portion 22 as well as at its end portion, the range of thicknesses of panels as attachment components becomes wide without requiring an increase in the length of the bush shank. The high resistance of the bush against pulling force can also be maintained. A preferable result has been obtained by making the length of the thin portion 22 from the root to the mid portion 23 substantially 30% of a maximum thickness of the panels 4 and 5 (Fig. 6).

In this first embodiment, the end of the bush shank 10 is provided with axially extending ribs 24 projecting radially inwardly. At the diameter enlargement coupled position of Figs. 6 and 7, the ribs 24 come in contact with the pin shank 8 to prevent the bush shank from bending radially inwardly. This increases the coupling force and makes the resistance of the clip against pulling force further higher.

Figs. 8 and 9 show a variation of the clip 1 of Figs. 1 through 7. This embodiment is formed with a recessed portion 25 which defines a space between the pin flange 7 and the bush flange 9 around the whole of the periphery of the pin flange 7 at the diameter enlargement coupled position. Accordingly, the end 26 of a tool such as a screw-driver can be inserted from any position so that the clip can be returned to the non-enlargement coupled position regardless of the direction of the screw-driver.

Figs. 10 through 17 show a third embodiment of a clip of the present invention. A clip 30 of this embodiment comprises a pin 31 and a bush 32, which are made of plastic material. As shown in Figs. 10 and 11, a bush shank of the clip 30 is inserted into the holes of the panels to be connected and the pin is forced into the bush shank to enlarge the diameter of the shank, so that the enlarged diameter portion of the bush shank and

the bush flange serve to connect the panels 4 and 5 to each other. Upon further pressing the pin shank, the diameter of the bush shank is again decreased to thereby allow the clip 30 to be pulled out of the panels 4 and 5.

As shown in Fig. 13, the pin 31 comprises a flange 34 and two legs 35 which are apart from each other toward the ends. As shown in Figs. 14 through 17, the bush 32 has a flange 36 and a shank 37 hanging down from the flange. The bush is hollowed to receive the legs 35 as the shank of the pin. The bush shank 37 are divided by a plurality of slits 38 to be enlarged diametrically when the pin legs 35 are inserted. On the end of the bush shank 37, a diametrically crossing engagement bar 40 is formed.

As shown in Fig. 10, the end of each leg 35 is formed with a recessed portion 41 to receive the engagement bar 40 to form a first engagement pawl 42 to engage with the engagement bar 40 so that the clip can be positioned at a non-enlargement coupled position that the legs 35 as the pin shank are inserted in the bush shank 37 but does not enlarge the bush shank diametrically. As shown in Fig. 11, the mid portion of each leg 35 has, on the inner side thereof, a second engagement pawl 43 engaging with the engagement bar 40 to hold the legs 35 apart from one another so that the clip can be positioned at a diameter enlargement coupled position that the pin legs 35 is further inserted in the bush shank 37 to enlarge the diameter of the end of the pin legs 35. As shown in Fig. 12, the inner side of each leg has a third engagement pawl 46 which is formed with a recessed portion 45 to receive the engagement bar 40 so that the clip can be positioned at a third position that the pin 31 is still further inserted in the bush shank 37 to return the bush shank 37 to the non-enlargement coupled position. Since the clip is constructed as described above, the pin 31 is simply inserted into the bush 32, so that the clip 30 can easily be mounted on the panels to connect the panels to each other and also removed from the panels.

In the bush shank 37 of the third embodiment, a root portion 47 adjacent the flange 34 also extends to a mid portion 48 with such a thickness that the root portion 47 is thinner than the mid portion 48. Accordingly, even if the thin panel 5 is connected to the panel 4, the bush shank 37 can also be bent in the thin root portion 47 to enlarge the diameter of the bush hank at the diameter enlargement coupled position so as to maintain high coupling force.

Industrial Applicability

In the bush shank of the clip according to the present invention, a root portion adjacent the flange

extends to a mid portion with such a thickness that the root portion is thinner than the mid portion. Thus, the bush shank can be bent in the root portion to enlarge the diameter of the bush hank so that high coupling force is established and maintained even for a thin panel. The clip can also deal with a wide range of panel thicknesses to produce sufficient coupling force regardless of the thicknesses of panels. The clip can prevent the connected panels from rising one from the other, and can maintain high resistance against pulling force.

The clip of the present invention can be so constructed that the clip is positioned between a non-enlargement coupled position that the pin shank is inserted in the bush shank but does not enlarge the bush shank diametrically and a diameter enlargement coupled position that the pin shank is further inserted in the bush shank so as to enlarge the diameter of the bush shank so that a higher resistance against to pulling force is enhanced. The clip can also be provided with a space between the pin flange and the bush flange around the periphery of the pin flange at the diameter enlargement coupled position, so that the end of a tool such as a screw-driver can be forced into the space to return the clip to the non-enlargement coupled position.

The clip of the present invention can be formed so that a diametrically crossing engagement bar is formed on the end of the hollow shank of the bush, the pin shank is composed of two legs apart from each other toward the end thereof, the end portion of each leg is formed with a first engagement pawl into engagement with the engagement bar for a non-enlargement coupled position, the mid portion of each leg has, on the inner side thereof, a second engagement pawl engaging with the engagement bar for a diameter enlargement coupled position that the bush shank is diametrically enlarged, and the inner side of each leg has a third engagement pawl having a recessed portion to receive the engagement bar for a third position that the pin is still further inserted in the bush shank to return the bush shank to the non-enlargement coupled position. Thus, removal of the clip can be further facilitated.

The present invention may be embodied in other specific ways without departing from the spirit or essential characteristics thereof. The preferred embodiments described herein are therefore to be considered in all respects as illustrative and not restrictive. The scope of the invention being indicated by the appended claims are not restrictive to the specification. And all variations and modifications which come within equivalent of the claims are intended to be embraced therein.

Claims

1. A clip comprising a pin including a flange and a shank; and a bush including a flange and a shank with the bush being hollowed for receiving the pin shank therein, wherein the bush shank is inserted in holes of attachment components to each other and then the pin shank is inserted into the bush shank to enlarge the diameter of the bush shank so that the attachment components are connected to each other by means of the enlarged diameter portion of the bush shank and the flange of the bush, characterized in that in the bush shank, a root portion adjacent the flange extends to a mid portion with such a thickness that the root portion is thinner than the mid portion. 5
2. The clip according to claim 1 wherein the length of the thinner portion between the root and mid portions of the bush shank is substantially 30% of a maximum thickness of the attachment components. 20
3. The clip according to claim 1 wherein the clip is positioned between a non-enlargement coupled position that the pin shank is inserted in the bush shank but does not enlarge the bush shank diametrically while the pin flange is spaced apart from the bush flange, and a diameter enlargement coupled position that the pin shank is further inserted into the bush shank to enlarge the diameter of the end portion of the bush shank by means of the end of the pin shank while the pin flange is in surface-contact with the bush flange, and the end portion of the bush shank is formed with radially inwardly projecting protrusions. 25 30 35
4. The clip according to claim 3 wherein the end portion of the bush shank is formed with ribs axially extending and radially inwardly projecting, so that the ribs are brought into engagement with the pin shank at the diameter enlargement coupled position to prevent the bush shank from bending radially inwardly. 40 45
5. The clip according to claim 3 wherein there is a space between the pin flange and the bush flange around the periphery of the pin flange at the diameter enlargement coupled position. 50
6. A clip comprising a pin including a flange and a shank; and a bush including a flange and a shank with the bush being hollowed for receiving the pin shank therein, wherein the bush shank is inserted in holes of attachment components to each other and then the pin shank is inserted into the bush shank to enlarge the diameter of the bush shank so that the attachment components are connected to each other by means of the enlarged diameter portion of the bush shank and the flange of the bush, characterized in that a space is formed between the pin flange and the bush flange for the insertion of the end of a tool. 5
7. The clip according to claim 6 wherein the space is formed around the whole of the periphery of the pin flange. 10
8. A clip comprising a pin including a flange and a shank; and a bush including a flange and a shank with the bush being hollowed for receiving the pin shank therein, wherein the bush shank is inserted in holes of attachment components to each other and then the pin shank is inserted into the bush shank to enlarge the diameter of the bush shank so that the attachment components are connected to each other by means of the enlarged diameter portion of the bush shank and the flange of the bush, characterized in that in the bush shank, a root portion adjacent the flange extends to a mid portion with such a thickness that the root portion is thinner than the mid portion; a diametrically crossing engagement bar is formed on the end of the hollow shank of the bush; the pin shank is composed of two legs apart from each other toward the end thereof; the end portion of each leg is formed with a recessed portion to receive the engagement bar to form a first engagement pawl to engage with the engagement bar so that the clip can be positioned at a non-enlargement coupled position that the pin shank is inserted in the bush shank but does not enlarge the bush shank diametrically; the mid portion of each leg has, on the inner side thereof, a second engagement pawl engaging with the engagement bar to hold the legs apart from one another so that the clip can be positioned at a diameter enlargement coupled position that the pin shank is further inserted into the bush shank to diametrically enlarge the end portion of the pin shank; and the inner side of each leg has a third engagement pawl which is formed with a recessed portion to receive the engagement bar so that the clip can be positioned at a third position that the pin is still further inserted into the bush shank to return the bush shank to the non-enlargement coupled position. 15 20 25 30 35 40 45 50 55

FIG. 1

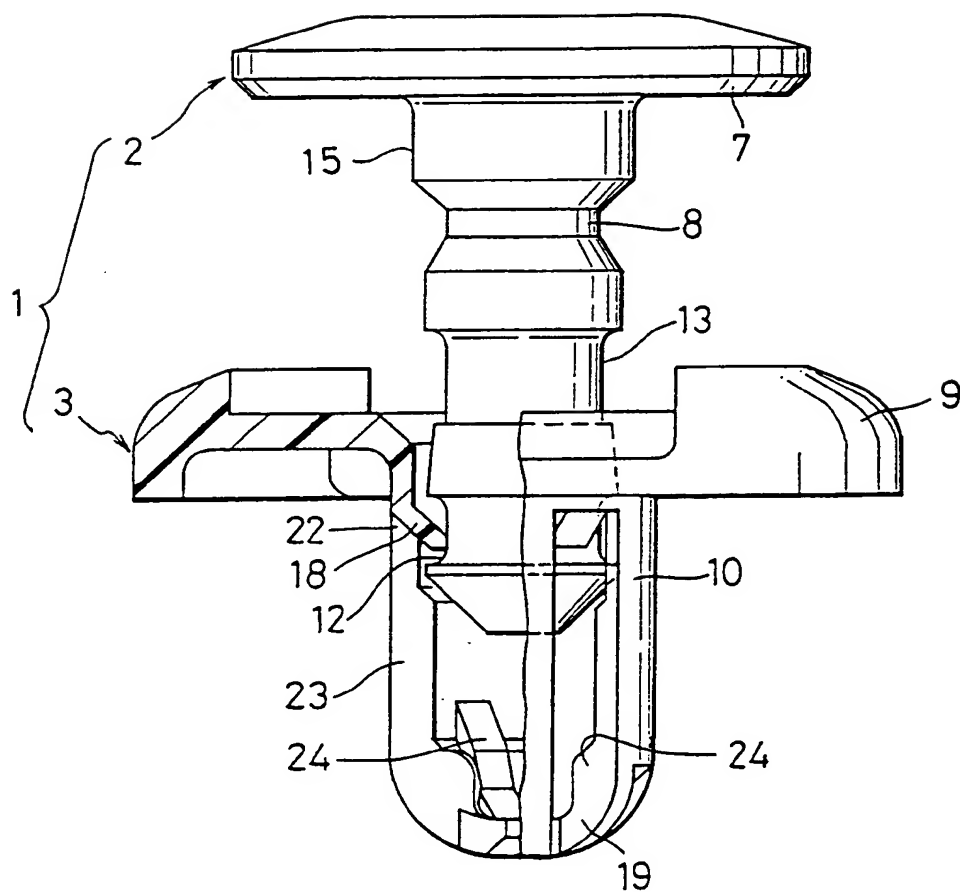


FIG. 2

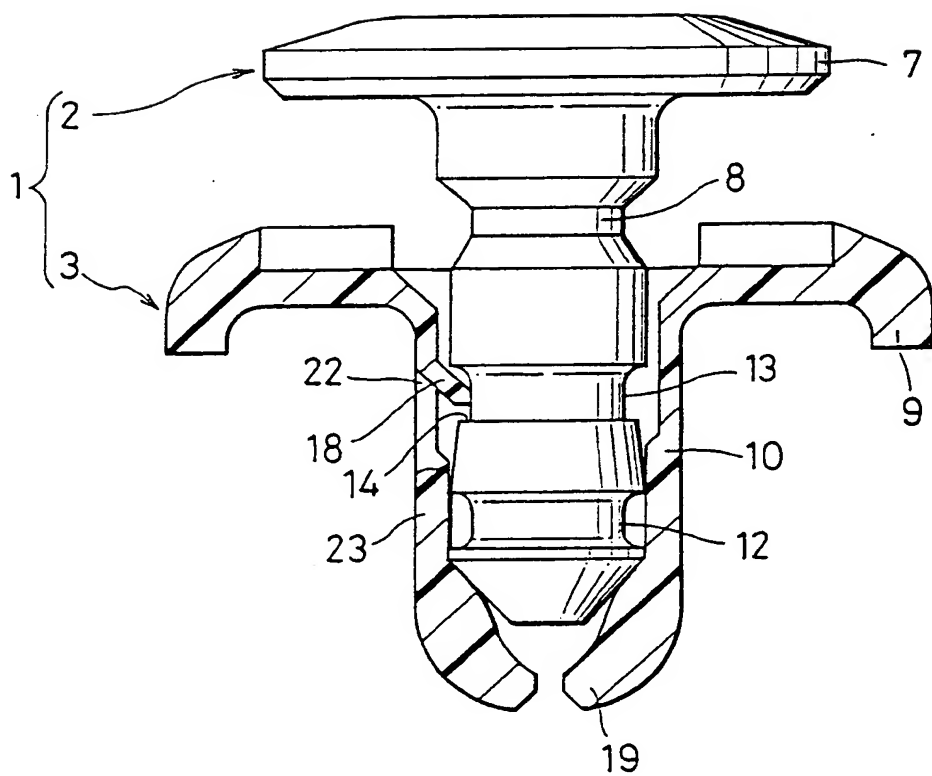


FIG. 3

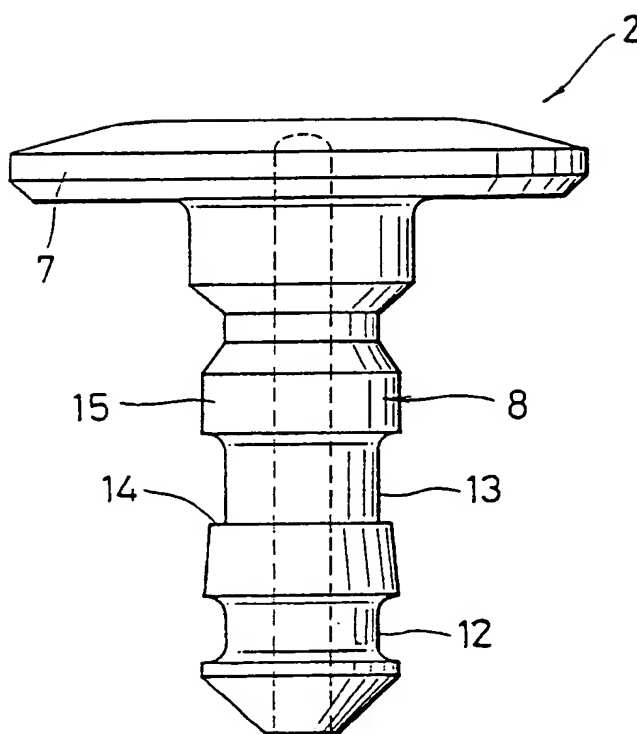


FIG. 4

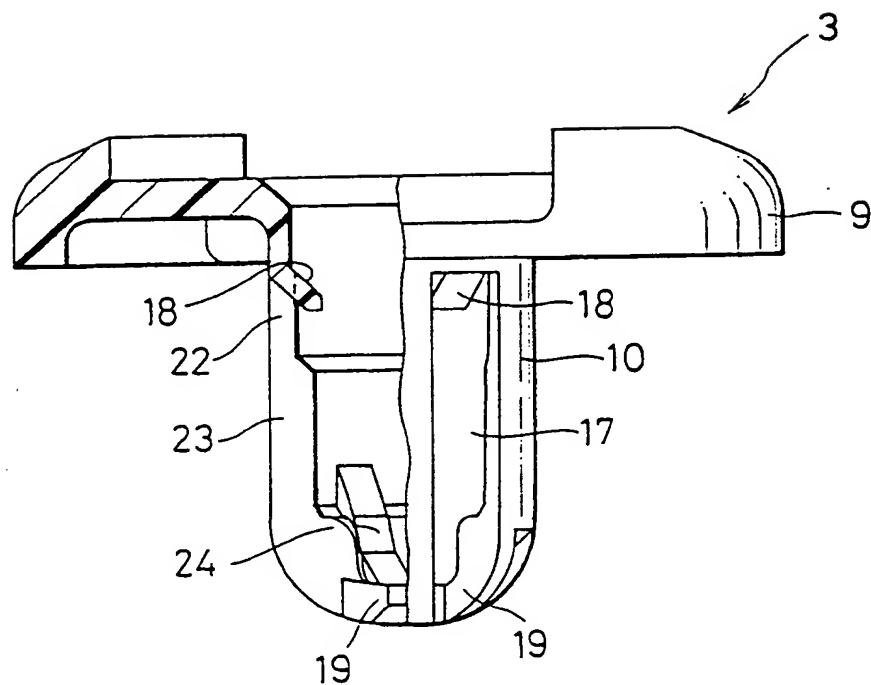


FIG. 5

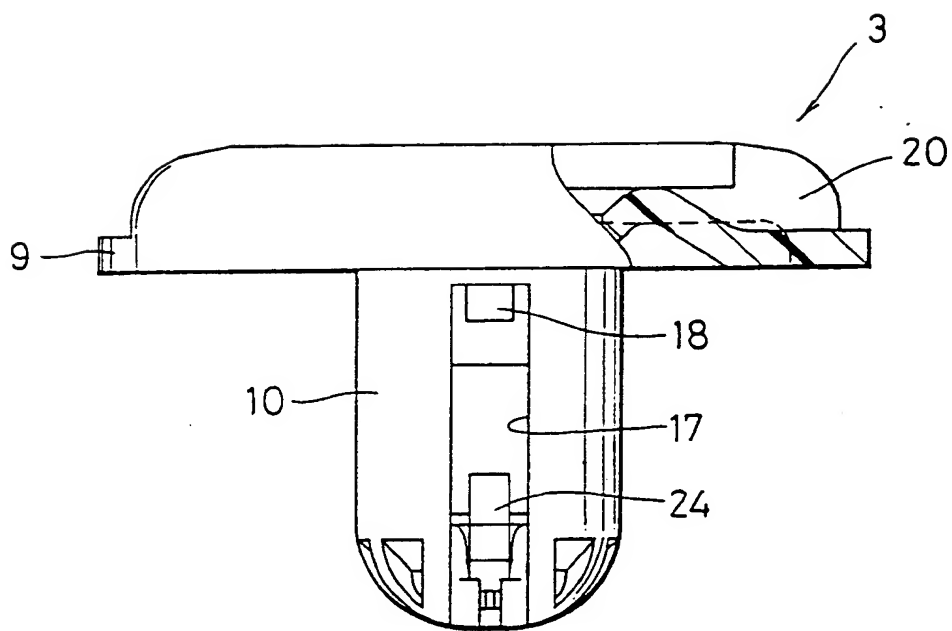


FIG. 7

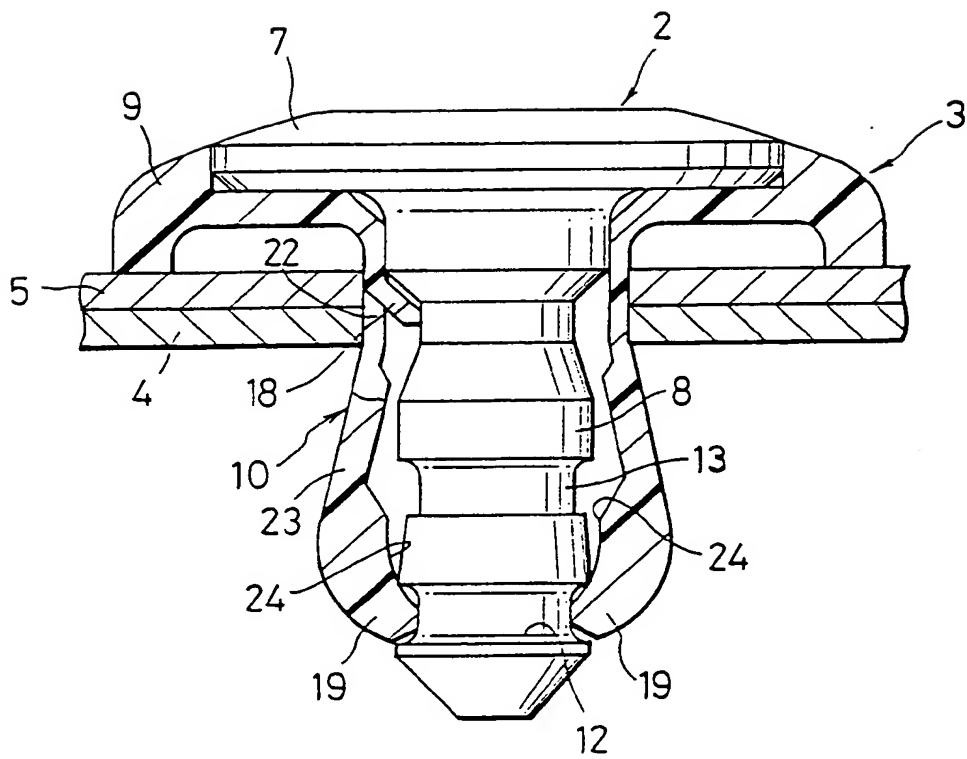


FIG. 8

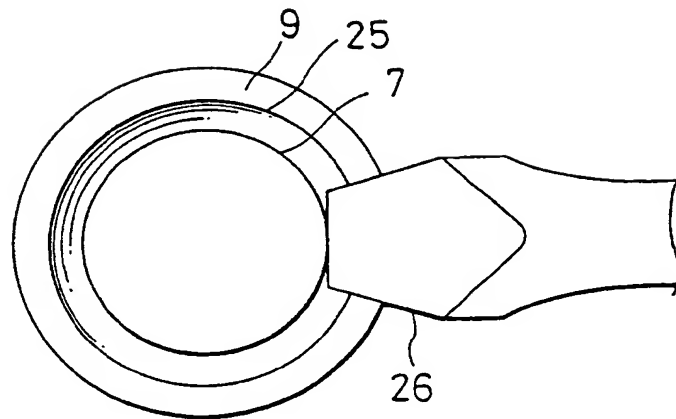


FIG. 9

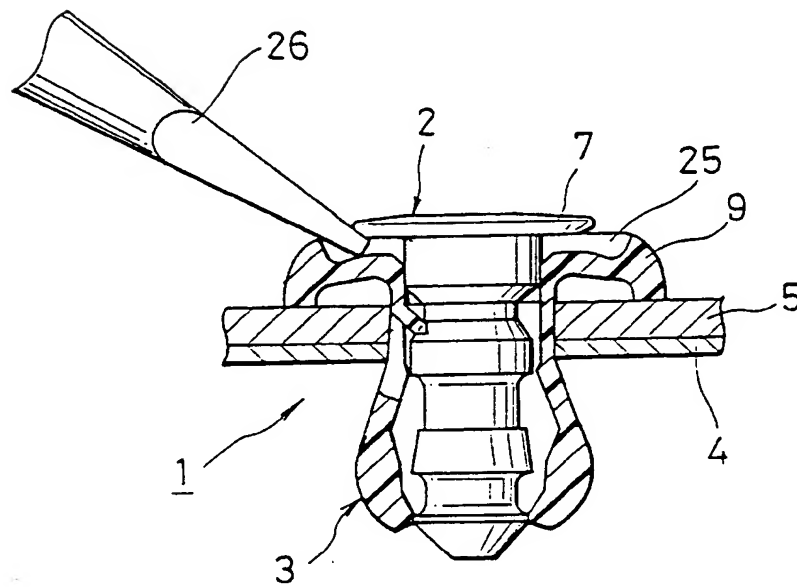


FIG. 10

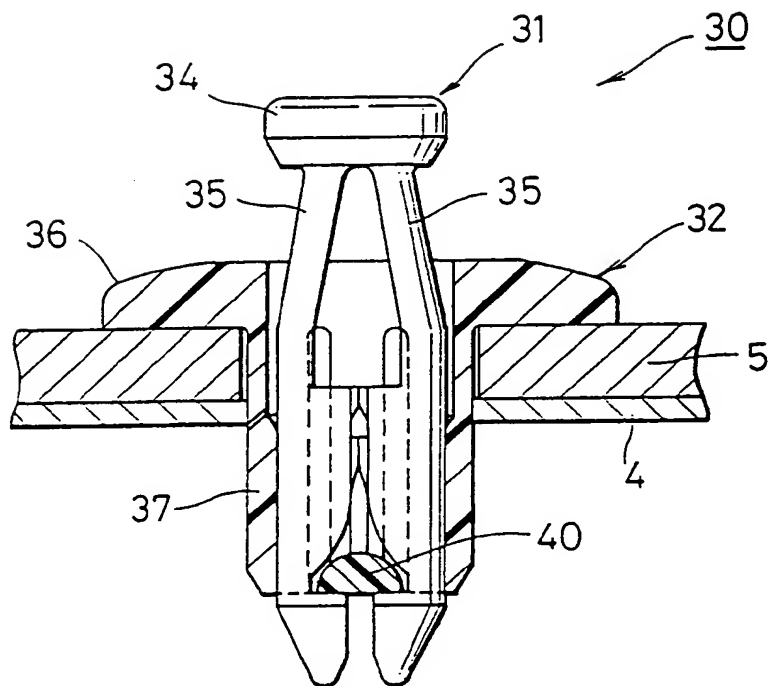


FIG. II

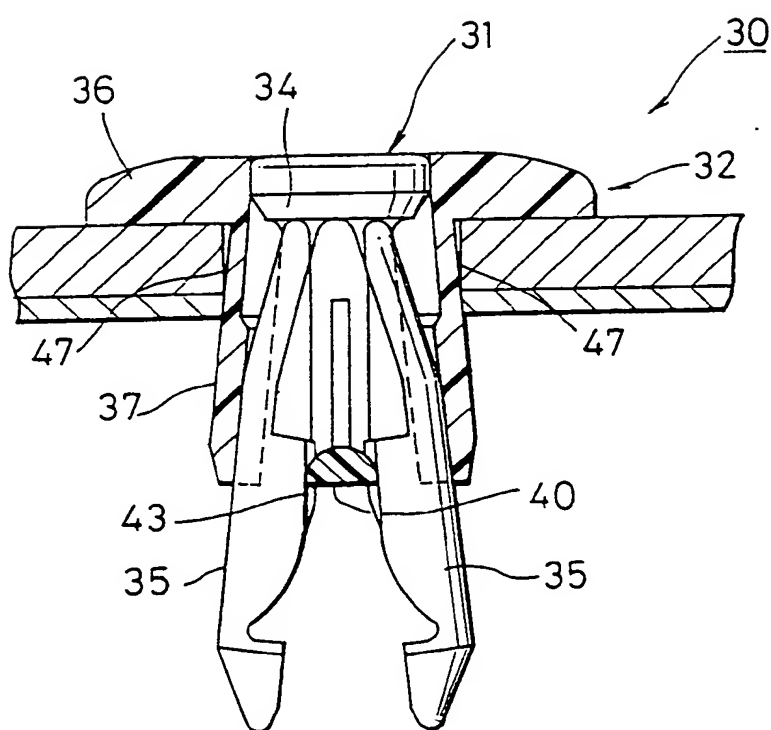


FIG. 12

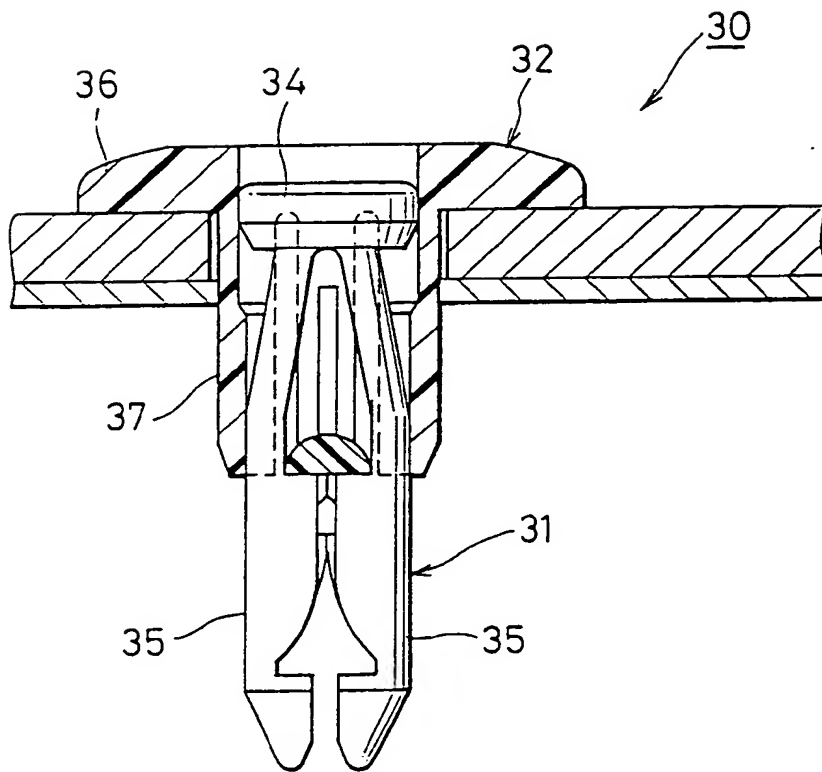


FIG. 13

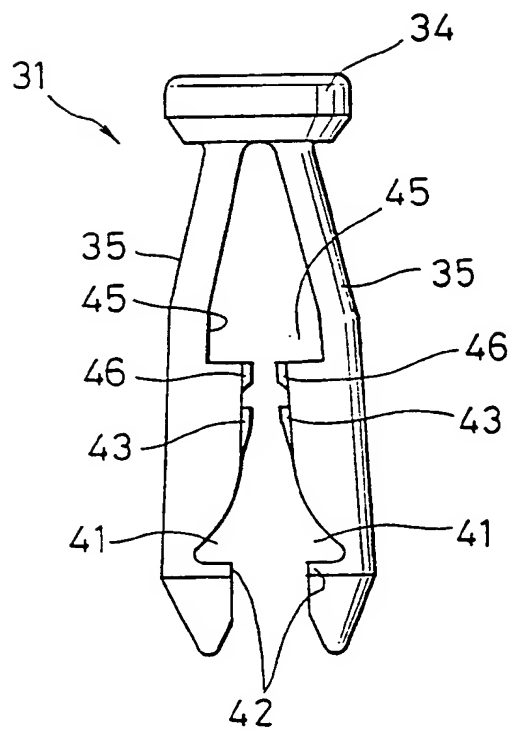


FIG. 14

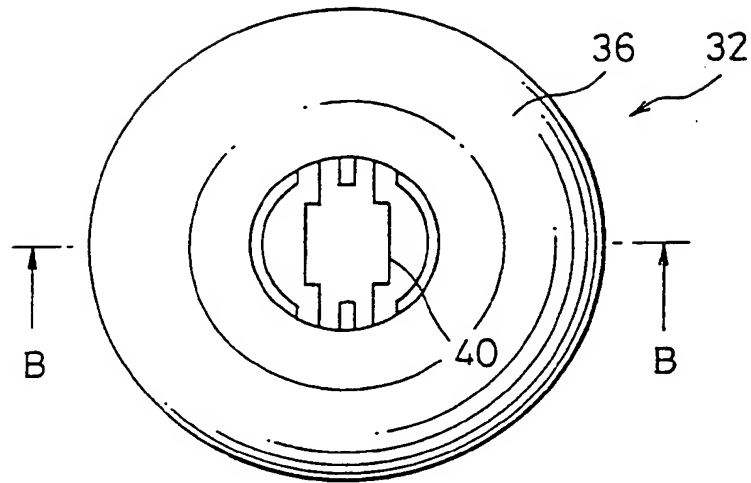


FIG. 15

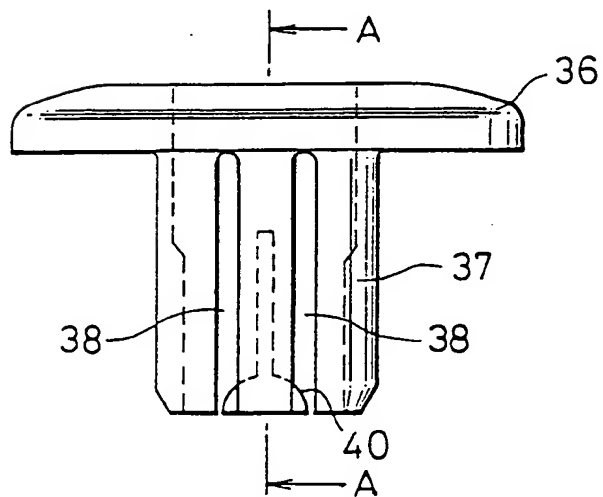


FIG. 16

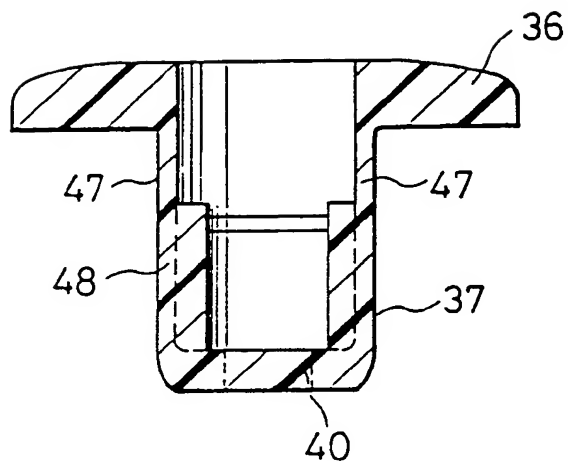
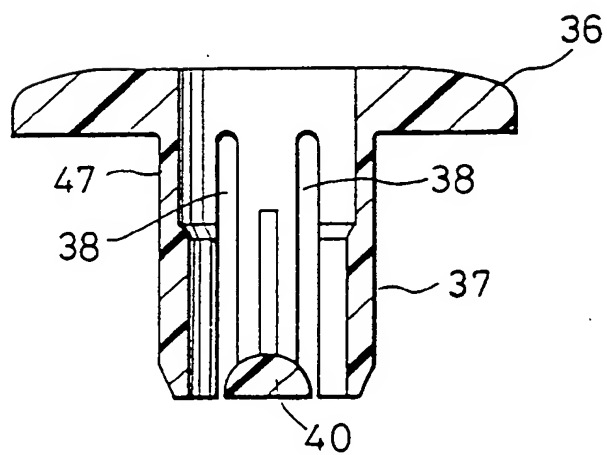


FIG. 17



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP94/01843

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl⁶ F16B19/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl⁶ F16B19/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1926 - 1995

Kokai Jitsuyo Shinan Koho 1971 - 1995

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP, U, 63-112607 (Daihatsu Motor Co., Ltd.), July 20, 1988 (20. 07. 88), Figs. 1, 5 (Family: none)	1-7
Y	Microfilm of Japanese Utility Model Application No. 200258/1984 (Laid-open No. 112108/1986), (Toyota Motor Corp.), July 16, 1986 (16. 07. 86), Lines 16 to 20, page 9, Figs. 7, 8 (Family: none)	1-7
Y	JP, Y2, 4-17859 (Nifuko K.K.), April 21, 1992 (21. 04. 92), Figs. 4, 9 (Family: none)	3-7
Y	Microfilm of Japanese Utility Model Application No. 5779/1989 (Laid-open No. 96010/1990), (Kato Hatsujo K.K.), July 31, 1990 (31. 07. 90), Lines 9 to 19, page 9 (Family: none)	5-7

☒ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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Date of the actual completion of the international search

January 23, 1995 (23. 01. 95)

Date of mailing of the international search report

February 14, 1995 (14. 02. 95)

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP, Y2, 56-34171 (Honda Motor Co., Ltd.), August 13, 1981 (13. 08. 81), Fig. 1 (Family: none)	8

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